



## Health needs assessment of workers in Kaveh industrial city

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### Abstract

**Background:** Health needs assessment (HNA) is essential for allocation of limited resources to the most prioritized problems. HNA in work places has gained increasing importance. Kaveh industrial city is the largest and oldest industrial city in Iran, with a wide range of different industries, making it an exemplary industrial city in Iran. This study was done to conduct health needs assessment of workers in Kaveh industrial city.

**Methods:** In this study, intensive HNA approach and qualitative method were used. In-depth interviews and Focus Group Discussions (FGDs) were conducted to collect information related to health risk factors, and Delphi method was used to prioritize these risk factors. A total of 74 key informants participated in this study, which constituted more than 80% of the total related experts of Kaveh industrial city.

**Results:** The main identified health challenge was inefficiency of the existing Health, Safety and Environment (HSE) control and monitoring system. The most important physical health risk factors were smoking and obesity and the most prioritized psychosocial risk factors were stress and lack of appropriate management and organizational culture. Ergonomic issues and noise pollution were the prioritized work environmental factors and inappropriate placement of pollutant industries in the industrial city was the most prioritized bioenvironmental risk factor. Unsafe road to industrial zone and poor safety devices used by workers were the most prioritized occupational injuries risk factors.

**Conclusion:** Addressing the identified health needs of workers in Kaveh industrial city is of high importance. Also, redefining the HSE control and monitoring system should be prioritized.

**Keywords:** Health needs assessment, Health promotion, Workers health, Industrial city

**Conflicts of Interest:** None declared

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### Introduction

Health needs assessment (HNA) is a widely used approach to provide intelligence for decision making and providing information on priorities to prevent wastage of resources in addressing the health needs of local commu-

nities. "Need" means the 'ability to benefit' from public health perspective; therefore, availability of intervention is a necessity for HNA (1). HNA allows allocating resources to the highest priorities, and planning tailored interven-

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#### ↑What is "already known" in this topic:

There are many reports of occupational health hazards and risks to the employees and workers in Kaveh industrial city and other industrial cities in Iran. The present HSE measures have not been able to address these risks and challenges, and no comprehensive health need assessment has been done on industrial cities in Iran.

#### →What this article adds:

This first comprehensive health needs assessment of employees in an industrial city showed that smoking and obesity, stress and depression, noise pollution, ergonomic issues, and wastes disposal were the main identified physical, mental, and bioenvironmental health risks. Redefining the HSE control and monitoring system was identified as the main priority.

tions to target the specific needs of local communities or population (2). HNA is a process that describes the state of health, enables the identification of major risk factors, and the actions required to address the health needs (3).

There are two approaches to HNA: The first is the intensive approach, which usually uses secondary data or experts' opinion, and the second is extensive approach, which usually involves different survey and primary data collections from the population. In the intensive approach, limited but deeply studied data are collected (4).

Today, health needs assessment in workplaces has become more important because of the change in occupational health. In the past, occupational health have been limited to occupational conditions that have affected employees' health; however, in recent decades, HNA has focused more on the physical, psychological, and social well-being of employees (1). Healthy work place model of the World Health Organization emphasized the importance of HNA in workplaces to not only promote the health of workers, but also promote the overall health of societies by reaching out to a large segment of the societies (5). Also, HNA and health promotion in workplaces has a great impact on productivity, reducing work leaves due to diseases and disability, and economic growth of industries and the whole country. The study of Burton et al showed that the number and the nature of health risks in employees were associated with a decrease in productivity. Also, the type of disease affects the level and patterns of productivity reduction (6).

Kaveh industrial city, located 100 km southwest of Tehran, and was founded in 1973, with an approximate area of 30 square kilometers. Being the oldest and one of the largest industrial areas of Iran, with more than 500 different types of industries, has made this industrial city an exemplary industrial city in Iran. Yet, no comprehensive study was conducted on HNA in this industrial city. Therefore, this study was conducted to identify the real needs of this industrial city and to determine the prioritized actions for policymakers to promote the health of its residences and workers. Also, Kaveh industrial city could be considered as a good model for many other industrial cities in the country, and HNA can provide a scenario for similar situations in other industrial cities in the country. Thus, this study was conducted to assess the health needs of employees in Kaveh industrial city and to prioritize them.

## Methods

In this study, intensive HNA approach and qualitative study methods were used. Secondary data, in-depth interviews, and FDGs were conducted to identify the main health risk factors of employees in Kaveh industrial city. Then, Delphi method was used to prioritize the identified risk factors. The experts were selected from a comprehensive list of all the occupational physicians of the industries and physicians of the 2 health centers in the city, key informants and experts from Saveh Medical University, HSE officers of different industries, safety and environmental related organizations such as fire stations and Environmental Protection Organization, and representatives

of the workers.

The sampling was done based on covering the maximum varieties of expertise. It was tried to obtain the opinion of all the experts and key informants in Kaveh industrial city. In total, 74 experts participated in the study, which constituted more than 80% of the total enlisted experts.

In-depth interviews were done with 10 key informants, including five occupational physicians and physicians working in the two health centers of the industrial city, the head of Environmental Protection Organization of city of Saveh, the head of the fire station located in the industrial city, the director of HSE Company, and the occupational health officer in Saveh Medical University. In-depth interviews were done based on a defined protocol and an open-ended questionnaire related to different health risk factors and needs. In-depth interviews provided a basis to develop another questionnaire for the FDGs.

Focused group discussions were done with 63 HSE officers of the total 80 HSE officers in the industrial city using an open-ended questionnaire. One facilitator and 2 mentors conducted the FDGs. A comprehensive list of health risk factors and needs was provided through in-depth interviews and FDGs.

The health challenges and needs were obtained based on the opinion of 74 experts who were involved in providing HSE and other health-related services to the workers and employees in Kaveh industrial city. Data collection form was used to obtain data related to the main physical, mental, social, and bioenvironmental health challenges of employees in Kaveh industrial city.

Delphi method, a structured way of collecting opinion of a panel of experts, was used to prioritize this comprehensive list. The experts gave their opinion on one or more questions in 2 or more rounds. In each round, a facilitator prepared an anonymized summary of the experts' opinions from the previous round; then, the experts were requested to revise their earlier answers based on the summary of other experts' views (7).

Delphi experts were the participants in the in-depth interviews and the FDGs. A total of 18 experts participated in the Delphi study. One round of Delphi was conducted, and because the experts' views had a high level of similarity (more than 80% agreement level), the second round of Delphi was not needed (Fig. 1).

The purpose of this study and confidentiality of data were explained to the participants. Verbal consent was obtained from the participants.

## Data analysis

All the interviews and the FDGs were audio recorded and transcript later on. Content analysis was used to analyze the qualitative data. The transcriptions were coded, recoded, and the study themes and subthemes were extracted.

Descriptive statistics, such as frequency and percentage, were used to describe the data. Statistical package for social sciences (SPSS) version 19.0 for windows (IBM Corporation, New York, United States) was used for data analysis.

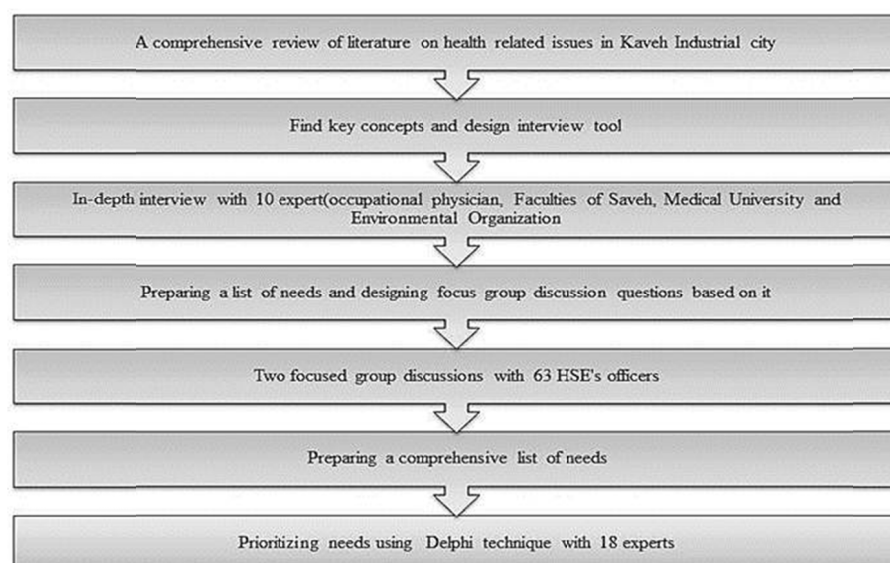


Fig. 1. Flow chart of stages of methodology

## Results

The analysis of data from the in-depth interviews revealed the main challenges and the health needs. The main identified challenges were inefficiency of monitoring processes and industry self-evaluation systems that provided possible chances for financial corruption and collusion. The main physical health risk factors was poor nutrition that catering contractors provided for the workers. Ergonomics problems and high smoking prevalence were the other identified health challenges. The main identified mental health risk factors included high level of stress and anxiety due to job insecurity and shift work, along with compulsory overtime work. Loneliness and depression, violence in workplace, social environment, and marginalization were the identified social risk factors. The most important risk factors of physical work environment were high level of chemical emissions, noise pollution, lack of adequate air condition in the workplace, lack of proper ventilation, moist environment, and insufficient light in

workplace.

Inappropriate location of polluted industries, poor performances of the sole chemical hazardous waste disposal company, improper disposal of industrial wastes mixed with domestic wastes, negligence of the presence of hazardous chemicals in sludge of water treatment, and lack of proper disposal of the sludge were the most significant bioenvironmental risk factors in Kaveh industrial city.

The most important risk factors of accidents and injuries were as follow: the unsafe storage of large amount of chemical explosives; lack of firefighters awareness of type of stored chemicals and scientific techniques for extinguishing them, in case of fire; negligence towards safety issues in production units; insufficiency of necessary safety devices in workplaces to protect workers; and lack of safety and standard devices for protecting hearing, visual, respiratory, and skin damages.

Based on the results of FDGs, the main health needs in Kaveh industrial city were categorized into 6 groups: (1)

Table 1. The physical health risk factors and common physical illness among workers in Kaveh Industrial City

The physical health risk factors of workers in Kaveh Industrial City	High priority [1-2]	Medium priority [3-5]	Low priority [6-7]
		N (%)	
Overweight and obesity	7(41.2)	10(58.8)	0(0.0)
Poor nutrition	7(38.9)	8(44.4)	3(16.7)
Physical inactivity due to lack of facilities and exercise opportunities	5(29.4)	9(52.9)	3(17.6)
Cigarette smoking and tobacco consumption	9(50.0)	8(44.4)	1(5.6)
Chronic fatigue and lack for adequate rest	6(33.3)	9(50.0)	3(16.7)
High blood pressure, lipid profile disorder and blood sugar	7(41.2)	7(41.2)	3(17.6)
Elevated liver enzymes among workers	3(17.6)	7(41.2)	7(41.2)
Common physical ailments	High priority [1-3]	Medium priority [4-6]	Low priority [6-9]
		No (%)	
Diabetes	4(26.7)	9(60.0)	2(13.3)
Musculoskeletal disorders	15(88.2)	2(11.8)	0(0.0)
Kidney stones and urinary tract infection	2(12.5)	12(75.0)	2(12.5)
Severe anemia among women	1(6.7)	8(53.3)	6(40.0)
Thalassemia	0(0.0)	3(21.4)	11(78.6)
Gastrointestinal problems	8(53.3)	5(33.3)	2(13.3)
Skin diseases	1(7.1)	5(35.7)	8(57.1)
Pulmonary disease because of toxic fumes	10(66.7)	3(20.0)	2(13.3)
Hearing loss	14(87.5)	2(12.5)	0(0.0)

physical health, (2) psychosocial health, (3) work environmental health, (4) bioenvironmental health, (5) accidents and injuries risk factors, and (6) the main burden of diseases.

Table 1 shows the most prioritized physical health risk factors and the main diseases of workers in Kaveh industrial city. The maximum number of experts (50.0%) considered cigarette smoking and tobacco consumption as a high priority risk factor, followed by overweight and obesity (41.2%), high blood pressure, lipid profile disorder, and high blood sugar (41.2%). The minimum number of experts (17.6%) pointed to the elevated liver enzymes among workers as a high priority risk factor. The maximum number of experts (88.2%) considered the musculoskeletal disorders the most common physical ailment, followed by hearing loss (87.5) and pulmonary disease due to toxic fumes (66.7%). The maximum number of experts considered thalassemia as the low priority among the common physical ailments.

Table 2 demonstrates the prioritization of psychosocial health risk factors of workers in Kaveh industrial city.

Most experts (82.4%) considered high level of stress as the high priority psychosocial health risk factor, followed by lack of appropriate management and organizational culture (75.0%) and lack of attention of employers to health of employees (75.0%). Table 3 displays physical environmental health risk factors among workers in Kaveh industrial city. Most experts (82.4%) considered negligence towards ergonomic issues as the high priority physical environmental health risk factor, followed by noise pollution (80.0%) and exposure to chemical hazardous pollutants (41.2%).

Table 4 shows the prioritization of bioenvironmental risk factors of Kaveh industrial city. Most experts (68.8%) considered inappropriate placement of pollutant industries in Kaveh industrial city as the high priority bioenvironmental risk factor, followed by the landfill near the village and city (66.7%) and lack of appropriate monitoring of the sole hazardous waste disposing company (56.3%).

Table 5 shows the prioritization of workers accidents risk factors. Many of the experts (81.3%) considered lack of safety of the sole road to Kaveh industrial city, fol-

Table 2. The most important psychosocial risk factors among workers in Kaveh Industrial City

The psychosocial risk factors among workers in Kaveh Industrial City	High priority [1-4]	Medium priority [5-8]	Low priority [9-12]
		N (%)	
High level of stress	14(82.4)	3(17.6)	0(0.0)
Depression	9(52.9)	7(41.2)	1(5.9)
Drug addiction	7(43.8)	8(50.0)	1(6.3)
Alcohol consumption	1(7.1)	6(42.9)	7(50.0)
Work shift	7(46.7)	6(40.0)	2(13.3)
Far distance of home to work	3(21.4)	4(28.6)	7(50.0)
Violent behaviors	3(20.0)	7(46.7)	5(33.3)
Lack of appropriate management and organizational culture	12(75.0)	1(6.3)	3(18.8)
Lack of attention of employers to employee health	12(75.0)	1(6.3)	3(18.8)
Family issues	6(40.0)	6(40.0)	3(20.0)
Compulsory or optional overtime	8(50.0)	6(37.5)	2(12.5)
Chronic fatigue	9(56.3)	5(31.3)	2(12.5)

Table 3. The physical environmental health risk factors among workers in Kaveh Industrial City

The physical environmental health risk factors among workers in Kaveh Industrial City	High priority [1-2]	Medium priority [3-4]	Low priority [5-6]
		N (%)	
Insufficient light in workplace and deprivation of sunlight	3(21.4)	4(28.6)	7(50.0)
Negligence towards ergonomics issues	14(82.4)	2(11.8)	1(5.9)
Noise pollution	12(80.0)	3(20.0)	0(0.0)
Exposure to chemical hazardous pollutants	7(41.2)	6(35.3)	4(23.5)
Lack of ventilation in the workplace and breath chemical vapors	6(37.5)	7(43.8)	3(18.8)
Moist work environment	1(7.1)	12(85.7)	1(7.1)

Table 4. The bio-environmental risk factors in Kaveh industrial city

The bio-environmental risk factors in Kaveh industrial city	High priority [1-3]	Medium priority [4-7]	Low priority [8-10]
		N (%)	
Inappropriate placement of pollutant industries in industrial city	11(68.8)	3(18.8)	2(12.5)
Negligence of the presence of hazardous chemicals in sludge of water treatment and lack of proper disposal of the sludge	6(37.5)	5(31.3)	5(31.3)
Transmission of contaminants to home through worker clothing	4(26.7)	7(46.7)	4(26.7)
Inappropriate disposal of hazardous waste	8(50.0)	5(31.3)	3(18.8)
Landfill near the village and city	10(66.7)	2(13.3)	3(20.0)
Keeping close proximity the chemicals that should not	3(20.0)	11(73.3)	1(6.7)
Weak and inefficient immune system to prevent and extinguish the fire	7(46.7)	5(33.3)	3(20.0)
Storage of flammable materials related to active and inactive industry as a potential risk factor for residents	7(46.7)	6(40.0)	2(13.3)
Deficiency in number of hazardous waste disposing companies and lack of appropriate monitoring of the sole hazardous waste disposing company	9(56.3)	6(37.5)	1(6.3)
Lack of or malfunctioning of filters of factory chimneys	8(50.0)	6(37.5)	2(12.5)



Table 5. The risk factor of accident among workers in Kaveh Industrial City

Risk factor of accident among workers in Kaveh Industrial City	High priority [1-2]	Medium priority [3]	Low priority [4-5]
		N (%)	
Lack of safety of the sole road to Kaveh industrial City	13(81.3)	1(6.3)	2(12.5)
Poor usage of safety devices by employees	8(53.3)	3(20.0)	4(26.7)
Lack of sufficient concentration of workers in the workplace because of excessive preoccupation and/or long hours of work	8(50.0)	3(18.8)	5(31.3)
Presence of workers on work while suffering from disease or pain	4(26.7)	2(13.3)	9(60.0)
Lack of adequate training of firefighters and lack of accurate information about stored chemicals in industries by firefighters	4(25.0)	4(25.0)	7(43.8)

lowed by low-staff use of safety equipment (53.3%) and lack of sufficient concentration of workers in the workplace due to excessive mental stress and/or working long hours as risk factors (50.0%).

### Discussion

The results of this study indicated that the main need for health is to redefine the employee health monitoring system. The reason for the inadequacy of the occupational health control system is self-assessment of the industries by employing HSE experts to assess the health of workers that despite the appropriate regulations, has resulted in corruption and lack of reporting of violations, which has led to endangering employees' health and irreparable damages to the environment. The ineffectiveness of this type of occupational health monitoring system has also been reported in other developing countries (8).

Smoking, obesity, and high blood pressure, lipid profile disorder, and high blood sugar were identified as the most prioritized physical health risk factors of the workers. The high prevalence of smoking, obesity, high blood pressure, lipid profile disorder, and high blood sugar has had an increasing trend in Iran in recent decades, and these health issues are among identified risk factors for chronic disease epidemic in the country (9-12); and workers of Kaveh Industrial City are not an exception. However, the synergic effects of these risk factors with other occupational risk factors such as exposure to chemical, physical, and noise pollutions are a matter of concern.

The most prioritized diseases among the employees were reported to be musculoskeletal disorders, hearing loss, and pulmonary diseases. Musculoskeletal disorders and hearing loss are the most prevalent occupational diseases in Iran (13). A systematic review by Costa and Vieira showed that heavy physical work, smoking, obesity, high psychosocial work stresses, and other comorbidities are among the main risk factors for the development of work-related musculoskeletal disorders. The most reported biomechanical risk factors include excessive repetition, awkward postures, and heavy lifting (14). Thus, ergonomic measures should be considered in work places where there is high level of exposure to these risk factors. High prevalence of pulmonary diseases among workers could be due to high hazardous chemical emission, which was reported frequently in Kaveh industrial city.

High level of stress, lack of appropriate management system and organizational culture, and lack of employers' attention to employees' health were among the most important psychosocial health risk factors. Occupational insecurity, irregular salary payment, long working hours,

and compulsory overtime work were the reported causes of high level of stress among workers. Lack of appropriate management system and organizational culture was reported in previous studies conducted in Kaveh industrial city (15). According to the staff reports, this type of leadership leads to violence, discrimination, and lack of sense of satisfaction and belonging to the company among employees, which in turn is one of the major risk factors for mental health of employees. Previous studies have reported inappropriate organizational culture in different industrial companies in Kaveh city due to the poor empowerment of workers and weak leadership and management system (16-17). Also, the study of Lee et al showed that lack of attention of employers to the provided safety and health devices and condition at work led to health problems of employees (18).

Negligence towards ergonomics of work places, noise pollution, and exposure to chemical hazardous pollutants were among the most important risk factors of work environments, which have resulted in high prevalence of musculoskeletal disorders, hearing loss, and pulmonary diseases among workers. The study of Mosavianasl et al. in 2017 showed that most of workers in steel industry in Iran were in danger of ergonomic problems at different levels, which is consistent with the results of this study (19).

The previous study of Arjmandi et al in Kaveh industrial city showed that the noise level was higher than the standard level at all sampling stations of their study. In the present study, it was reported that silica was the most prevalent chemical pollutant; however, Arjmandi et al. reported that nitrogen oxide was the most polluting chemical in Kaveh industrial city (20).

Many bioenvironmental risk factors were reported by the experts, but inappropriate placement of pollutant industries in the industrial city, the landfill near the village and city, and lack of appropriate monitoring of the only hazardous waste disposing company in the industrial city were among the most prioritized bioenvironmental risk factors. Negligence of bioenvironmental risk factors could lead to irreversible environmental catastrophe. Pollution of land and water resources could even influence health of the next generation of residents and staff of Kaveh industrial city and adjacent areas. Other studies in Kaveh industrial city have, similarly, showed high level of soil and air pollution (21-22). The study of Mojtazadeh in Tabriz revealed the impact of the location of industries on pollution of cities, which is consistent with the findings of the current study (23). In 2017, Vosoogh et al. showed that the new and old landfill sites for solid waste disposal in Mashhad were inappropriate and increased the risk of pol-

lution in groundwater (24).

Arjmandi et al., in a study on assessing the bioenvironmental impact of Kaveh industrial city, showed that the industrial residue and improper waste management were among the leading causes of adverse bioenvironmental impact of Kaveh industrial city (20). Salehi et al. reported that heavy metal, especially lead pollution, was one of the main pollutants in the waste deposition place of the mentioned industrial city (25, 22).

Lack of safety of the sole road to Kaveh industrial city, Low-staff use of safety equipment, and lack of concentration of workers in the workplace due to mental stress and long hours of work were among the most prioritized injury-related risk factors in Kaveh industrial city. Building a safer road for Kaveh industrial city, with a population of over 35 000, and a very high traffic, and providing at least one ambulance for the industrial city are among the first municipal public responsibilities to protect the lives of workers and residents of the city. Empowering workers needs serious and sustained programs. Thus, training programs should be implemented to change the attitudes of staff towards health needs so that they demand workplace safety.

In addition, many unrevealed depots of explosives and toxic chemicals are among major potential risk factors for ecological and human disasters in the area.

### Limitations

As this study used the intensive HNA model, all information was based on the opinions of experts and no primary data were collected. However, these challenges were overcome by increasing the number of experts ( $n = 74$ ) who participated in this study.

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### Conflict of Interests

The authors declare that they have no competing interests.

### References

- Tobi P. Health Needs Assessment. In Public Health Intelligence. Springer International Publishing. 2016:169-186.
- Kitreerawutiwo N, Mekrungrongwong S. Health behavior and health need assessment among elderly in rural community of Thailand: a sequential explanatory mixed methods study. *Life (Jaipur)*. 2015 Nov 15;1(2).
- Phillips JL, Rolley JX, Davidson PM. Developing targeted health service interventions using the PRECEDE-PROCEED model: two Australian case studies. *Nurs Res Pract*. 2012;2012.
- Watkins R, Meiers MW, Visser Y. A guide to assessing needs: Essential tools for collecting information, making decisions, and achieving development results. World Bank Publications; 2012 Jan 6.
- Burton J, World Health Organization. WHO Healthy workplace framework and model: Background and supporting literature and practices. 2010 Feb.
- Rongen A, Robroek SJ, van Lenthe FJ, Burdorf A. Workplace health promotion: a meta-analysis of effectiveness. *Am J Prev Med*. 2013 Apr 1;44(4):406-15.
- Keeney S, McKenna H, Hasson F. The Delphi technique in nursing and health research. John Wiley & Sons; 2010 Nov 29.
- Duflo, Esther, Michael Greenstone, Rohini Pande, and Nicholas Ryan. 2013. "Truth-Telling by Third-Party Auditors and the Response of Polluting Firms: Experimental Evidence from India." *The Quarterly Journal of Economics* 128(4): 1-49. Available from: <https://www.povertyactionlab.org/sites/default/files/publications/truth-telling-in-third-party-audits.pdf>
- Forouzanfar MH, Sepanlou SG, Shahrz S, BESc PN, Pourmalek F, Lozano R, et al. Evaluating causes of death and morbidity in Iran, global burden of diseases, injuries, and risk factors study 2010. *Arch Iran Med*. 2014 May 1;17(5):304.
- Farzadfar F, Danaei G, Namdaritabar H, Rajaratnam JK, Marcus JR, Khosravi A, et al. National and subnational mortality effects of metabolic risk factors and smoking in Iran: a comparative risk assessment. *Popul Health Metr*. 2011 Dec;9(1):55.
- Shara NM. Cardiovascular disease in Middle Eastern women. *Nutr Metab Cardiovasc Dis*. 2010 Jul 1;20(6):412-8.
- Azizi F, Salehi P, Etemadi A, Zahedi-Asl S. Prevalence of metabolic syndrome in an urban population: Tehran Lipid and Glucose Study. *Diabetes Res Clin Pract*. 2003 Jul 1;61(1):29-37.
- ISNA Press. Backache, hearing loss, and dermal problem are the most prevalent diseases, News code 91100301447, 3rd Day 2011. <http://www.isna.ir/news/91100301447>
- da Costa BR, Vieira ER. Risk factors for work-related musculoskeletal disorders: a systematic review of recent longitudinal studies. *Am J Ind Med*. 2010 Mar;53(3):285-323.
- Aghajani T, Shoghi B. Study of Effect of Managers' Leadership Style on Employees Creativity (Case Study: Metal Industries of Kaveh Industrial City). *J Dev Manage*. 2014;17:45-53.(Persian)
- Shoghi B, Tahmoreth A. Assessment of the effect of organizational structure on organizational culture (case study: Metal industries in Kaveh Industrial City). *Quant Res Manag*. 2013; (2): 83-100
- Tahmoreth A, Azizi G, Shoghi B, Rezazadeh A, Najmabadi A. Assessment of the effect of organizational structure on organizational culture (case study: Pars Aluminum Company in Kaveh Industrial City). *Cultur Manag*. 2012;16(6):65-80.
- Lee BH, Chen JC, Fo KW. Accidents in Construction Sites: A Study on the Causes and Preventive Approaches to Mitigate Accident Rate. *INTI J*. 2018;1(3).
- Mosavianasl Z, Nemati Ajvadi A, Babaei Pouya A. Evaluation of Workplaces and Corrective Actions in the Central Iranian Steel Industries. *Arch Hyg Sci*. 2018;7(3):208-15.
- Arjmandi R, Jozi SA, Motahari S. Assessment of bio-environmental impact of Kaveh Industrial City. *J Environ Sci Technol*. 2008;9(4): 31-45.
- Hani A. Spatial distribution and risk assessment of As, Hg, Co and Cr in Kaveh Industrial City, using geostatistic and GIS. *Int J Environ Earth Sci*. 2010 Nov 26;1(1):38-43.
- Salehi A, Mirghaffari N, Koohnejad H, Mahmoudi F. Evaluating the role of industrial sludge as a source of heavy metal. *Pollution. Department of Environment, Faculty of Natural Resources, Isfahan University of Technology, Isfahan, I. R. Iran. Feyz*: 2012;16(7):719-720
- Mojtabazadeh H. The role of industries in air pollution and guidelines: a case study of the city of Tabriz. *WIT Transact Ecol Environ*. 1970 Jan 1;84.
- Vosoogh A, Baghvand A, Karbassi A, Nasrabadi T. Landfill Site Selection Using Pollution Potential Zoning of Aquifers by Modified DRASTIC Method: Case Study in Northeast Iran. *Iran J Sci Technol Transact Civil Engineer*. 2017 Jun 1;41(2):229-39.
- Hani A, Karimineja MT. Toxic metal distribution in Soils of Kaveh Industrial city Iran. *World Appl Sci J*. 2010;8(11):1333-42.